

Effect of Task Reassignment on Physician Productivity in a Hospital Clinic

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REASSIGNMENT OF TASKS from the physician to other members of the health team has been proposed as a means of increasing physician productivity, reducing health costs, and responding to physician deficits in medically underserved areas (1). Introduction of computerized health testing and medical history taking in the outpatient department of a large municipal hospital in New York City afforded an opportunity to study the effect of such task reassignment on the productivity of physicians in the department's central medical clinic.

A computerized multiphasic testing center was set up at the hospital in November 1972 as the initial stage of a clinic reorganization project called Project Care, supported by a grant from the New York Metropolitan Regional Medical Program. The center, staffed by health support personnel, served non-emergent symptomatic patients referred from the emergency room. After workup at the center, the patients were sent to the central medical clinic for diagnosis and treatment.

With the Federal Government's halting of the regional medical programs, the project was terminated in April 1973. The effect on physician productivity was one of the few elements of the project that could be evaluated.

As has been noted in another study, automated health testing may affect physicians' actions in different ways (2). On the one hand, physicians may spend more time with patients because the test results require them to seek further information. On the other hand, physicians may average less time per patient because some of their functions have been performed by the health testing unit.

In Project Care, only two tasks were reassigned from the physicians in the central medical clinic to the testing center: the taking of a medical history and measurement of blood pressure. Other activities of the testing center either had previously been done by units other than the central medical clinic or had not been done at all except in special circumstances. In the first category were blood and urine tests, ECG and X-ray examinations, and the Papanicolaou test. In the latter category were spirometry, tonometry, and dental examinations.

The following analysis explores some of the dynamics associated with the reduction of tasks performed by physicians in a clinic setting. The focus is on physician input and output and the length of time patients had to wait for appointments. As neither the cost nor the quality of services was measured for either the testing center or the central medical clinic, the cost effectiveness of the task reassignment could not be determined.

The evaluation of Project Care involved a quasi-experimental design using patient population samples and associated clinic procedures. Patients of the central medical clinic before and after the initiation of the project constituted the control and test groups, respectively. Sample size varied for the measures comprising the evaluation because several data sources were used. Quantitative data were obtained from clinic records, routine collection of statistics on clinic operations, and selected sampling by the staff of specific operations not otherwise recorded.

Since the source of the clinic patients—that is, patients treated and triaged in the emergency room—was the same in both periods, the characteristics of the patients can be assumed to have remained constant.

Measures of Productivity

The central medical clinic was staffed by three full-time and four part-time salaried internists. To determine the impact of the Project Care testing center on the clinic's activities, the following measures were examined:

1. Physician input: Physician-patient contact time for the initial clinic visit, which immediately followed the patient's testing in the workup center, and for revisits.

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2. Physician output: The number of patient visits per day, including both initial visits and revisits.

3. The number of calendar days the patients waited between the emergency room visit and the initial clinic visit.

4. The number of calendar days the patients waited between the initial clinic visit and the first revisit.

Physician-patient contact time. As shown in the following tabulation, the average physician-patient contact time was 11 minutes less for Project Care patients than for patients seen before the project, a reduction significant at the 99 percent level of confidence:

Measure	Before	
	Project Care	Project Care
Number of patients in sample	90	36
Average contact time (minutes)	22.3	33.3
Standard deviation	11.78	22.08

For Project Care patients, initial clinic visits averaged 26 minutes and revisits, 21 minutes. There was also a reduction in the dispersion of contact time, with the coefficient of variation dropping from 0.66 to 0.5.

Since Project Care affected only the initial visit to the clinic, it seems reasonable to assume that the saving of 11 minutes is due entirely to a reduction in the time for that visit. Strengthening this inference is the fact that after the testing center had been in operation 2 months, it was possible to reduce the time allocated for initial visits to the clinic.

Visits per day. The following data show the average number of visits to the clinic per day before and after Project Care:

Measure	Before	
	Project Care	Project Care
Number of days in sample	43	56
Average number of visits per day:		
Initial visits	8.7	7.2
Standard deviation	2.38	1.56
Revisits	46.3	46.4
Standard deviation	5.74	7.55
All visits	55.0	53.6
Standard deviation	8.26	5.75

The increase of 1.5 in the average daily number of initial visits to the clinic was significant at the 99 percent confidence level. The slight increase in the dispersion measure probably reflects an adjustment to new clinic procedures.

There was no statistically significant change in the

average number of revisits after initiation of the project. There was little change in the dispersion around a mean of 46 patients per day, with a coefficient of variation lower than that for patients making their initial visit either before or after Project Care was begun.

The total patient load of the clinic, reflecting a ratio of revisits to initial visits of approximately 6 : 1, showed no significant change between the two periods.

Waiting time. For analysis of the waiting time between the emergency room visit and the initial clinic visit, it was necessary to use contemporary patients of the outpatient department's general medical clinic as the control group because no accurate data related to this measure were compiled in the central medical clinic before Project Care. The general medical clinic is staffed by hospital residents under the guidance of the supervising physician of the central medical clinic and is in operation two mornings a week. Emergency room physicians make no distinctions in referrals to these two clinics. Clinic administrators asserted that the waiting time for contemporary patients of the general medical clinic approximated that for patients of the central medical clinic before Project Care. Using the general medical clinic patients as the control, we estimate that the waiting time declined by 50 percent after Project Care:

Measure	Project Care	General medical clinic
	Number of patients in sample	104
Average number of calendar days between emergency room visit and initial clinic visit	6.7	14.1
Standard deviation	2.79	2.00

In contrast to this finding, the average number of calendar days the patients waited between their initial clinic visit and their first revisit increased by 2.3 days, a change that was statistically significant at the 95 percent confidence level.

Measure	Project Care	Before Project Care
	Number of patients in sample	201
Average number of calendar days between initial clinic visit and first revisit	30.2	27.9
Standard deviation	11.71	16.11

This increase in waiting time suggests that the process of accommodating to the increased number of patients seen for initial visits included lengthening of the waiting time for a revisit. Additional

analysis of the data showed that revisit waiting time for the first 100 patients after initiation of Project Care was longer than for the next 100 patients by almost 3 days: 31.6 compared with 28.8 (although with this smaller sample the difference was not significant at the 90 percent confidence level). Even though the second 100 patients still averaged a longer waiting time than patients before Project Care, the level of confidence for statistical inference is much lower than for the finding on all patients. Moreover, the number of days of waiting for a revisit did decline, even as the total number of patients for which the central medical clinic accepted continued responsibility increased.

The increased waiting time for revisits may reflect an initial reaction of the clinic physicians to an accelerated referral system. The subsequent decline could be due to increased acceptance of the new system by the physicians despite responsibility for more patients. The pressure of the continued increase in patient load, however, was not completely absorbed by the decline in the amount of time physicians spent with the patients and resulted in the lengthening of revisit waiting time.

Use of Time Saved

These findings have shown a saving in physician-patient contact time and the use of the saving in the additional number of patient visits scheduled in the central medical clinic after introduction of the computerized testing center. The link between these two measures of physician productivity can be further explored through the following equation:

$$S(PS) = dPS(T) + dPNS(T') + T''$$

$$11(7.2) = 1.5(26) + 0 + T''$$

$$79 = 39 + 0 + T''$$

$$T'' = 40$$

where

- S = physician time saved per initial visit
- PS = number of initial visits per day before Project Care
- dPS = additional number of initial visits per day after Project Care
- T = physician-patient contact time for initial visits after Project Care
- $dPNS$ = additional number of revisits per day after Project Care
- T' = physician-patient contact time for revisits after Project Care
- T'' = time saved as a result of reduction in physician-patient contact time not accounted for

Thus, Project Care resulted in a saving of 79 minutes per day on initial visits. Of this time, 39 minutes was used for additional initial visits, leaving 40 minutes of the saved time unaccounted for. This unaccounted for time would have permitted an additional 1.5 initial visits or almost 2 revisits per day. The reduction in revisit waiting time for the second 100 patients suggests that with further experience and tighter administrative measures, the unaccounted for time could have been cut down considerably and perhaps entirely eliminated.

Conclusions

Few studies of multiphasic health testing systems have focused on their effect on physician productivity (3). This study of patient populations and clinic procedures in a large municipal hospital is therefore important for what it reveals of the process of change in productivity.

- Physician-patient contact time was reduced, and a larger daily volume of patient visits could be absorbed. However, only half the time saved was used for additional patient visits. The failure to use more of the time saved may have been the result of difficulties associated with the introduction of new procedures. As the physicians became habituated to the increased flow of patients, use of more of the saved time would be expected.
- As the volume of initial visits increased, calendar waiting time for revisits increased. Waiting time for revisits might also have responded favorably with the physicians' acceptance of an increased volume of patients and use of more of the time saved.
- As a general principle, whatever the portion of the time saved that is used for additional patient visits, there is a tradeoff at the margin in the allocation of the time to initial visits or to revisits. That is, the apportionment of the saved time is flexible between the two types of visits and could directly affect both waiting periods.

References

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